

# Ty Lees

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## Education

<b>Ph.D.</b>	<i>University of Technology Sydney</i>	August 2018
Cognitive psychophysiology	<i>"The impact of Stress and Anxiety on the neurocognitive performance of Australian Nurses: An electroencephalographic and psychometric assessment"</i> Thesis Advisors: A/Prof. Sara Lal, Dr Najah Nassif, Prof. Phillip Newton	
<b>B.MSc</b>	<i>University of Technology Sydney</i>	November 2012
Honours 1 <sup>st</sup> Class	<i>"Occupational stress and cognitive performance in nurses. An exploratory study: electroencephalographic and psychometric assessment."</i> Thesis Advisor: A/Prof. Sara Lal	

## Research Interests

- Self-monitoring; specifically, using system-level approaches to examine the development of these behaviors, and how this translates into broader self-regulation, psychopathology, and academic outcomes.
- Multi-modal psychophysiology; with an initial focus on combining peripheral and neural electrophysiology to investigate cognition and its development and psychopathological modulation.
- Electrophysiological measurement as biomarkers; with an aim to find novel markers of cognitive function, neurodevelopment, and psychopathology.

## Professional Positions

<b>Postdoctoral Research Fellow</b>	<i>Center for Depression, Anxiety, and Stress Research, McLean Hospital</i> Advisor: Prof. Diego A. Pizzagalli	July 2023 - Present
<b>Postdoctoral Research Fellow</b>	<i>Department of Psychiatry, Harvard Medical School</i> Advisor: Prof. Diego A. Pizzagalli	July 2023 - Present
<b>Postdoctoral Scholar</b>	<i>Edna Bennett Pierce Prevention Research Center, The Pennsylvania State University</i> Advisor: Prof. Lisa M. Gatzke-Kopp	May 2019 – July 2023
<b>Research Assistant</b>	<i>School of Life Sciences, University of Technology Sydney</i> Advisor: A/Prof. Sara Lal	May 2017 – March 2019
<b>Associate Lecturer</b>	<i>School of Life Sciences, University of Technology Sydney</i>	March 2016 – December 2018
<b>University Tutor</b>	<i>School of Medicine, University of Notre Dame (Australia)</i>	November 2017 – October 2018
<b>Casual Lecturer   Demonstrator</b>	<i>School of Medical &amp; Molecular Biosciences, University of Technology Sydney</i>	February 2012 – December 2017

## Honors and Awards

Australian Postgraduate Award <i>Australian Research Council</i>	2013 – 2016 (~\$75,000 USD)
Dean's Merit List for Academic Excellence <i>University of Technology Sydney</i>	2013

## Grants & Contracts

HealthSense: Technological human health sensors capable of providing feedback and intervention <i>New South Wales Defence Innovation Network</i> Co-Investigator	2018 (~\$81,000 USD)
A review of current evidence about mental disorders, and psychological and other wellbeing programs in the law enforcement workplace <i>New South Wales Police Force</i> Consultant	2016 (~\$22,000 USD)

## Publications

<sup>†</sup> corresponding author; <sup>‡</sup> equal first author contribution, ... additional authors pending

### In Preparation or Under Review

1. **Lees, T., ...**, and Gatzke-Kopp, L.M., (2023). A multi-dimensional ERP assessment of reward processing and it's relationships with depressive symptomatology. *Psychological Medicine (In Prep)*.
2. **Lees, T., ...**, Fisher, Z. F., and Gatzke-Kopp, L.M., (2023). Performance monitoring and its development – A cognitive systems perspective. *Neuroscience & Biobehavioral Reviews (In Prep)*.
3. Singh, A.K., Lal, S., Akella, A., John, A.R., Maharaj, S., Newton, P.J., Gustin S.M., McLachlan, C.S., Clifton-Bligh, R., **Lees, T.**, Lin, C.T. (2023). Heart-rate variability classification using recurrent convolution neural network. *IEEE Journal of Biomedical and Health Informatics (In Prep)*.
4. **Lees, T.**, Ram, N., Swingler, M.M., and Gatzke-Kopp, L.M., (2023). Hair type and texture, and their influence on electroencephalogram and event-related potential data quality. *Psychophysiology (Submitted)*.
5. **Lees, T.**<sup>‡</sup>, Chalmers, T.<sup>‡</sup>, Burton, D., Zilberg, E., Penzel, T., and Lal, S. (2023). Psychophysiology of Monotonous Driving, Fatigue and Sleepiness in Train & Non-professional Drivers: Driver Safety Implications. *Behavioral Sciences (Submitted)*.

### Journal Articles

1. **Lees, T.**, White, R., Zhang, X., Ram, N., and Gatzke-Kopp, L.M., (2022). Decision-making in uncertain contexts: The role of autonomic markers in resolving indecision. *International Journal of Psychophysiology*, 177, doi: [10.1016/j.ijpsycho.2022.05.014](https://doi.org/10.1016/j.ijpsycho.2022.05.014)
2. Chalmers T., Eaves, S., **Lees, T.**, Lin, C.T., Newton, P.J., Clifton-Bligh, R., McLachlan, C.S., Gustin, S.M., and Lal, S., (2022). The relationship between neurocognitive performance and HRV parameters in nurses and non-healthcare participants. *Brain and Behavior*, 12(3), doi: [10.1002/brb3.2481](https://doi.org/10.1002/brb3.2481)
3. **Lees, T.**<sup>†</sup>, Fry, C.M., Terrell, S., Jetha, M.K., Segalowitz, S.J., and Gatzke-Kopp, L.M. (2021). Developmental changes in external and internal performance monitoring across middle childhood: an ERP study. *International Journal of Psychophysiology*, 169, doi: [10.1016/j.ijpsycho.2021.09.002](https://doi.org/10.1016/j.ijpsycho.2021.09.002)

4. Lees, T.<sup>‡</sup>, Fry, C.M.<sup>‡</sup>, Jetha, M.K., Segalowitz, S.J., and Gatzke-Kopp, L.M. (2021). Association between EEG Asymmetry and the Error-related Negativity across Middle Childhood. *Biological Psychology*, 163, doi: [10.1016/j.biopsycho.2021.108137](https://doi.org/10.1016/j.biopsycho.2021.108137)
5. Akella, A., Singh A.K., Leong, D., Lal, S., Newton, P.J., Clifton-Bligh, R., McLachlan, C.S., Gustin, S.M., Maharaj, S., Lees, T., Cao, Z., and Lin C.T. (2021). Classifying multi-level stress responses from brain cortical EEG in Nurses and Non-health professionals using Machine Learning Auto Encoder. *IEEE Journal of Translational Engineering in Health & Medicine*, 9, doi: [10.1109/JTEHM.2021.3077760](https://doi.org/10.1109/JTEHM.2021.3077760)
6. Jarman, L., Elliott, J.L., Lees, T., Clifton-Bligh, R., Simpson, A.M., Nassif, N., and Lal, S. (2021). Heart rate variability as a potential non-invasive marker of blood glucose level. *Human Physiology*, 47, doi: [10.1134/S0362119721020031](https://doi.org/10.1134/S0362119721020031)
7. Lees, T.<sup>‡</sup>, Chalmers, T.<sup>‡</sup>, Burton, D., Zilberg, E., Penzel, T., Lal, S., and Lal S. (2021). Electrophysiological brain-cardiac coupling in train drivers during monotonous driving. *International Journal of Environmental Research and Public Health*, 18, 3741, doi: [10.3390/ijerph18073741](https://doi.org/10.3390/ijerph18073741)
8. Lees, T., Maharaj, S., Kalatzis, G., Nassif, N., Newton, P.J., and Lal, S. (2020). Electroencephalographic prediction of global and domain specific cognitive performance of clinically active Australian Nurses. *Physiological Measurement*, 41(9), doi: [10.1088/1361-6579/abb12a](https://doi.org/10.1088/1361-6579/abb12a)
9. Chalmers, T.<sup>‡</sup>, Maharaj, S.<sup>‡</sup>, Lees, T., Lin, C.T., Newton, P.J., Clifton-Bligh, R., McLachlan, C.S., Gustin, S.M., and Lal, S. (2020). Impact of acute stress on cognitive-cardiac coupling in Australian Nurses. *Journal of Integrative Neuroscience*, 19(2), doi: [10.31083/j.jin.2020.02.74](https://doi.org/10.31083/j.jin.2020.02.74)
10. Lees, T., Elliott, J.L., Gunning, S., Newton, P.J., Rai, T., and Lal, S. (2019). A systematic review of the current evidence regarding interventions for anxiety, PTSD, sleepiness and fatigue in the law enforcement workplace. *Industrial Health*, 57(6), doi: [10.2486/indhealth.2018-0088](https://doi.org/10.2486/indhealth.2018-0088)
11. Maharaj, S., Lees, T., and Lal, S. (2019). Prevalence and risk factors of depression, anxiety, and stress in a cohort of Australian nurses. *International Journal of Environmental Research and Public Health*, 16(1), doi: [10.3390/ijerph16010061](https://doi.org/10.3390/ijerph16010061)
12. Lees, T.<sup>‡</sup>, Chalmers, T.<sup>‡</sup>, Burton, D., Zilberg, E., Penzel, T., Lal, S., and Lal, S. (2018). Electroencephalography as a predictor of self-report fatigue/sleepiness during monotonous driving in train drivers. *Physiological Measurement*, 39(10), doi: [10.1088/1361-6579/aae42e](https://doi.org/10.1088/1361-6579/aae42e)
13. Maharaj, S., Lees, T., and Lal, S. (2018). Negative mental states and their association to the cognitive function of nurses. *Journal of Psychophysiology*, 33(3), doi: [10.1027/0269-8803/a000223](https://doi.org/10.1027/0269-8803/a000223)
14. Lees, T., Shad-Kaneez, F., Simpson, A.M., Nassif, N., Lin, Y., and Lal, S. (2018). Heart rate variability as a biomarker for predicting stroke, post-stroke complications and functionality. *Biomarker Insights*, 13, doi: [10.1177/1177271918786931](https://doi.org/10.1177/1177271918786931)
15. Lees, T., and Lal, S. (2017). Stress and its impact on the cognitive performance of Australian nurses. *Stress and Health*, 33(1), doi: [10.1002/smi.267](https://doi.org/10.1002/smi.267)
16. Lees, T., Nassif, N., Simpson, A.M., Shad-Kaneez, F., Martiniello-Wilks, R., Lin, Y., Jones, A., Qu, X., and Lal, S. (2017). Recent advances in molecular biomarkers for diabetes mellitus: a systematic review. *Biomarkers*, 22(7), doi: [10.1080/1354750X.2017.1279216](https://doi.org/10.1080/1354750X.2017.1279216)
17. Lees, T., Khushaba, R., and Lal, S. (2016). Electroencephalogram Associations to Cognitive Performance in Clinically Active Nurses. *Physiological Measurement*, 37(7), doi: [10.1088/0967-3334/37/7/968](https://doi.org/10.1088/0967-3334/37/7/968)
18. Rothberg, L.J., Lees, T., Clifton-Bligh, R., and Lal, S. (2016). Associations between heart rate variability and blood glucose levels: implications for non-invasive glucose monitoring. *Diabetes Technology & Therapeutics*, 18(6), doi: [10.1089/dia.2016.0010](https://doi.org/10.1089/dia.2016.0010)

## Reports

1. Lal, S., **Lees, T.**, Elliott, J.L., Rai, T., Gunning, S., and Newton, P. (2016). A review of current evidence about mental disorders and psychological and other wellbeing programs in the law enforcement workplace. Sydney, Australia. Commissioned by the NSW Police Force.

## Conference Abstracts

1. **Lees, T.**<sup>†</sup>, Fisher, Z.F., Gatzke-Kopp, L.M., (2022). Performance monitoring and its development – A cognitive systems approach. *Psychophysiology*; 58(S1), doi: [10.1111/psyp.14141](https://doi.org/10.1111/psyp.14141)
2. **Lees, T.**<sup>†</sup>, Fry, C.M., Terrell, S., Jetha, M.K., Segalowitz, S.J., and Gatzke-Kopp, L.M. (2020). Developmental changes in ERP measures of external and internal performance monitoring across middle childhood. *Psychophysiology*, 57(S1), doi: [10.1111/psyp.13670](https://doi.org/10.1111/psyp.13670)
3. Shad, K.F., **Lees T.**, Lal, S., Aghazadeh, Y., and Kress, B. (2019). Auditory pathway and Alzheimer's disease. *IBRO Reports*, 6(S57), doi [10.1016/j.ibror.2019.07.190](https://doi.org/10.1016/j.ibror.2019.07.190)
4. **Lees, T.**<sup>†</sup>, Maharaj, S., Kalatzis, G., Nassif, N., Newton, P., and Lal, S. (2018). The neurocognitive relationship between stress and anxiety, and memory and decision-making performance of Australian nurses. *Psychophysiology*, 55(S1), doi: [10.1111/psyp.13264](https://doi.org/10.1111/psyp.13264)
5. **Lees, T.**<sup>†</sup>, Kalatzis, G., and Lal, S. (2015). Examining negative mental states and their association to psychometric and electroencephalographic measures of cognitive performance in Australian Nurses. *Psychophysiology*, 52(S24), doi: [10.1111/psyp.12495](https://doi.org/10.1111/psyp.12495)
6. **Lees, T.**<sup>†</sup>, Maharaj, S., and Lal, S. (2015). Electroencephalographic markers of subjective cognitive performance: Implications towards electrophysiological prediction of early cognitive decline. *Frontiers in Human Neuroscience*. doi: [10.3389/conf.fnhum.2015.219.00057](https://doi.org/10.3389/conf.fnhum.2015.219.00057)

## Presentations

### Invited Presentations

1. **Lees, T.**, Chalmers, T., Burton, D., Zilberg, E., Penzel, T., Lal, S., and Lal, S. (2019). Electroencephalography as a predictor of train driver fatigue & sleepiness. *Oral Presentation*: Centre for Sleep and Chronobiology weekly seminar. Woolcock Institute of Medical Research, Sydney, Australia.
2. **Lees, T.**, (on behalf of Lal, S.). (2018). Health Sensors and Countermeasures. *Oral Presentation*: Defence Innovation Network Pilot Project Sandpit Workshop. Western Sydney University, Sydney, Australia.
3. **Lees, T.** (2015). Stress and Cognitive Performance in Nurses: An example of research in the NRU. *Oral Presentation*: Warfighter Effectiveness Research Centre (WERC) United States Airforce Academy Brownbag, Colorado Springs, USA.
4. **Lees, T.**, and Lal, S. (2015). Research and collaboration in the Neuroscience Research Unit (NRU). *Oral Presentation*: Warfighter Effectiveness Research Centre (WERC) United States Airforce Academy Brownbag, Colorado Springs, USA.

### Conference Presentations

1. **Lees, T.**, Fisher, Z. F., and Gatzke-Kopp, L.M. (2022). Performance monitoring and its development: A cognitive systems perspective. *Poster Presentation*: 61<sup>st</sup> Annual meeting of the Society for Psychophysiological Research, Vancouver, Canada
2. Terrell, S., **Lees, T.**, and Gatzke-Kopp, L.M. (2021). Neural sensitivity to feedback moderates the association between parental discipline and child externalizing behaviour. *Oral Presentation*: 54<sup>th</sup> Annual meeting of the International Society for Developmental Psychobiology, Chicago, USA.

3. **Lees, T.,** Drummond, C.P., Seay, D.M., Garber, J.M., Lohay, G., and Eswara, P. (2021). Case study in pivoting to an online format and using Canvas to host a postdoctoral research exhibition. *Online Presentation (COVID-19): 2021 National Postdoctoral Association Annual Meeting.*
4. **Lees, T.,** Fry, C.M., Terrell, S., Jetha, M.K., Segalowitz, S.J., and Gatzke-Kopp, L.M. (2020). Developmental changes in ERP measures of external and internal performance monitoring across middle childhood. *Online Presentation (COVID-19): 60<sup>th</sup> Annual meeting of the Society for Psychophysiological Research.*
5. **Lees, T.,** Maharaj, S., Kalatzis, G., Nassif, N., Newton, P, and Lal, S. (2018). The neurocognitive relationship between stress and anxiety, and memory and decision-making performance of Australian Nurses. *Poster presentation: 58<sup>th</sup> Annual meeting of the Society for Psychophysiological Research, Quebec City, Canada*
6. Maharaj, S., **Lees, T.,** Zaslowski, C., Fatima-Shad, K., and Lal, S. (2017). Assessing the link between negative mental states and cognitive performance in health professionals. *Poster Presentation: Australasian Cognitive Neuroscience Society Conference, Adelaide, Australia*
7. Kalatzis, G., **Lees, T.,** Nassif, N., Zaslowski, C., and Lal, S. (2017). Exploring cognitive function in diabetes and non-diabetes samples using electroencephalography (EEG) and psychometric assessment: a comparative study. *Oral presentation: 37th Annual Scientific Meeting of the Australasian Neuroscience Society, Sydney, Australia*
8. Hopkins, Z., **Lees, T.,** and Lal, S. (2017). Cardiovascular and Autonomic Associations to post-traumatic stress disorder symptomatology. *Oral Presentation: Inter-University Neuroscience & Mental Health Conference, Sydney, Australia.*
9. Maharaj, S., **Lees, T.,** Zaslowski, C., Fatima-Shad, K., and Lal, S. (2017). The prevalence of depression in a cohort of Australian Nurses. *Poster presentation: Inter-University Neuroscience & Mental Health Conference, Sydney, Australia.*
10. Vine, M., **Lees, T.,** Nassif, N., Simpson, A. M., and Lal, S. (2017). Investigating the associations between ADHD symptomology and chronic illness: cardiovascular disease and diabetes mellitus. *Poster Presentation: Inter-University Neuroscience & Mental Health Conference, Sydney, Australia.*
11. Maharaj, S., **Lees, T.,** and Lal, S. (2016). Electroencephalographic changes in beta & gamma reactivity associated with cognitive performance. *Poster Presentation: Inter-University Neuroscience & Mental Health Conference, Sydney, Australia*
12. Kalatzis, G., **Lees, T.,** Nassif, N., Zaslowski, C., and Lal S. (2016). Investigating cognitive function in diabetes and healthy samples using electroencephalography (EEG) and psychometric assessment: a comparative study. *Oral Presentation: Inter-University Neuroscience & Mental Health Conference, Sydney, Australia*
13. Jarman, L.R., Elliott J.L., **Lees, T.,** Nassif, N., Simpson, A.M. Clifton-Bligh, R., and Lal, S. (2016). Associations between heart rate variability and blood glucose levels. *Poster presentation: New Horizons – 33rd Combined Health Science Conference, Sydney, Australia.*
14. Ricciardiello, A., Elliott, J.L., **Lees, T.,** and Lal, S. (2016). Emotion regulation and stress: physiological assessment. *Poster presentation: New Horizons – 33rd Combined Health Science Conference Sydney, Australia*
15. Gorval, M., **Lees, T.,** Elliott, J.L., Nassif, N., Simpson, A.M., Clifton-Bligh, R., and Lal, S. (2016). Investigation of the association between blood glucose levels, anxiety and depression. *Poster presentation: New Horizons – 33rd Combined Health Science Conference; Sydney, Australia*
16. **Lees, T.,** Kalatzis, G., and Lal, S. (2015). Examining negative mental states and their association to psychometric and electroencephalographic measures of cognitive performance in Australian Nurses. *Poster presentation: 55th Annual meeting of the Society for Psychophysiological Research, Seattle, USA*
17. **Lees, T.,** Maharaj, S., and Lal, S. (2015). Electroencephalographic markers of subjective cognitive performance: Implications towards electrophysiological prediction of early cognitive decline. *Oral Presentation: 25th Annual Conference of the Australasian Society for Psychophysiology, Sydney Australia*

18. **Lees, T.,** and Lal, S. (2015). Negative mental states, their association to frontal lobe brain activity and the effect of coping. *Oral Presentation:* Inter-university Neuroscience & Mental Health Conference, Sydney, Australia.
19. Elliott, J., **Lees, T.,** Nassif, N., and Lal, S. Stress and the New South Wales Police Force: The prevalence of various coping mechanisms. *Oral Presentation:* Inter-university Neuroscience & Mental Health Conference 2015, Sydney, Australia.
20. Maharaj, S., **Lees, T.,** and Lal, S. (2015). Cognitive function associations to mental states in nurses. *Poster presentation:* New Horizons – 32nd Combined Health Science Conference, Sydney, Australia.
21. Kalatzis, G., **Lees, T.,** Nassif, N., and Lal, S. (2015). Investigating Cognitive Function in Clinical and Healthy Samples using Electroencephalography and Psychometric Assessment: A Comparative Study. *Poster Presentation:* New Horizons – 32<sup>nd</sup> Combined Health Science Conference, Sydney, Australia
22. Elliot, J.L., **Lees, T.,** Nassif, N., and Lal, S. (2014). Cardiovascular measures and sleep health associations with shift work in police officers: A physiological assessment. *Oral Presentation:* New Horizons – 31st Combined Health Science Conference, Sydney, Australia
23. Kalatzis, G., **Lees, T.,** and Lal, S. (2014). Investigating cognitive performance in different racial groups: an exploratory study using electroencephalography and psychometric Assessment. *Poster presentation:* New Horizons – 31st Combined Health Science Conference, Sydney, Australia
24. **Lees, T.,** and Lal, S. (2013). Electroencephalography and its associations to cognitive performance in nurses: an exploratory assessment. *Poster Presentation:* New Horizons – 30<sup>th</sup> Combined Health Science Conference, Sydney, Australia.
25. **Lees, T.,** and Lal, S. (2012). Occupational stress and cognitive performance in nurses. *Poster Presentation:* New Horizons – 29th Combined Health Science Conference, Sydney, Australia.

## Teaching Experience

### Undergraduate Courses

Health and Homeostasis  
 Medical and Applied Physiology (Psychophysiology)  
 Molecular and Systems Neuroscience/Neuroanatomy  
 Pathophysiology and Pharmacology  
 Physiological Systems

### Graduate Courses (Medical School)

Basic and Clinical Sciences  
 Molecular and Systems Neuroscience

## Professional Activities

### Academic Service & Outreach

Society of Psychophysiological Research committee member <i>(Education and Training; Promote Student's Interests)</i>	2021 – 2024
Organizing committee member for PSU Postdoctoral Research Exhibition	2020
Reviewer for Society for Research in Child Development Biennial Meeting <i>(Biological Processes: Neuroscience and Genetics &amp; Cognitive Processes)</i>	2020, 2022

### Society Memberships

Society for Neuroscience	2020 – Present
Society for Psychophysiological Research	2015 – Present
Society for Research in Child Development	2020 – Present

## Journal Reviewing

*Annals of Work Exposures and Health*

*Brain Sciences*

*Int J Environmental Research & Public Health*

*Journal of Neural Engineering*

*Psychology Research & Behavior Management*

*Sensors*

*Biomarkers*

*Child Development*

*Int J Human-Computer*

*Interface*

*Neurocritical Care*

*Psychophysiology*

*BMJ Open*

*Developmental Psychobiology*

*Int J Psychophysiology*

*Physiological Measurement*

*Sleep and Breathing*